Criterion 6 Indicator 34: Supply and consumption/use of non-wood products.

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I. Indicator presentations

A. Rationale for use of the indicator:

1. Rationale from the Section of the Montreal Process Technical Advisory Committee (TAC) notes on Indicator 34:

This indicator measures the extent to which the supply of non-wood products meets the needs of consumption. A measure of consumption per capita may reflect the cultural affinity to these products, the level of disposable income, or the price or availability of these products. High per capita consumption levels might also reflect pressures on forest resources.

2. Interpretation from the TAC:

This indicator is related to indicators dealing with forest cover, health, production, investment and recycling. Trends in the indicator may reflect changes in either supply or demand. They may also be influenced by changes in social values placed on the products. Trends should be considered in the context of forest management objectives and sustainability.

3. U.S. clarification of the indicator and additions to rationale:

"Societal demands" is a more appropriate descriptor than "needs of consumption".
There are no national forest management objectives for nontimber forest products (NTFPs).
There is large-scale (industrial) production for some NTFPs.
National consumption, as well as the demand for consumption, of NTFPs is unknown.

B. Data available to quantify the indicator.

Nontimber forest products include many plants, lichens, and fungi from forests, including understory species used in floral markets, for seasonal greenery, as wild foods, for medicinals, as plant extracts, and for transplants. Posts and poles, firewood, and Christmas trees are all significant secondary tree products in many regions. Information about game animal and fur-bearer populations and harvest is collected by State and Federal agencies, but national information is not generally available for all species. Game animals in U.S. forests are an important source of food to many people. In many parts of the United States, producing goods from native plants has become an active expression of cultural survival and conservation of indigenous knowledge. Domestication for many extractive products may mean improved conservation of the natural resources by reducing pressure on stocks. Domestication of many native species in the US has been quite successful, such as cranberries (*Vaccinium* spp.) and pecans (*Carya illinoensis*), both grown agriculturally on a large scale. Domestication of other species, such as ginseng (*Panax quinquefolius*) and goldenseal (*Hydrastis canadensis*) has been successful, but prices for wild product is still high enough to keep pressure on the wild resource.

National legislation does not explicitly state that nontimber forest products will be addressed in forest planning. However, among 32 eastern forest plans examined by Chamberlain and others (2002), seven addressed NTFPs to some extent. No National Forest plan devoted more than one percent of its text to NTFPs.

This Indicator can only be measured indirectly, because demand for most nontimber forest products has not been assessed. It is known that there is pressure on some resources in some regions (such as wild genseng and wild *Echinacea* subspecies). Consumption per capita can only be estimated in very general ways. Nontimber forest products are an integral and important part of many rural communities lifestyle and economy, allowing people to make ends meet during times of economic hardship. The harvest and first levels of production of many goods, such as Christmas wreaths or grave blankets made of boughs, gives people a source of supplemental income (Alexander and other 2002, Emery 1998). Because many businesses are very small enterprises, and people who harvest NTFPs are often individuals with small annual incomes, much of the economic activity in the primary production levels of these industries is in the informal economy. There are no data kept on informal economic activities, and they remain largely invisible to analysts. Once the products reach higher-level production and distribution, they are scattered into many economic activity categories, including nurseries, landscaping, pharmaceutical, floral, and so on. Disaggregating the contribution of NTFPs to these industries would be very complex, time consuming, and expensive. However, without NTFPs, many of these industries would not be nearly so robust.

One indicator of demand and consumption of NTFPs is the range of products for which people seek harvest permits on public lands. Table 1 summarizes special forest product permit sales for fiscal year 2000 from US Department of Interior Bureau of Land Management (BLM) lands. Table 2 summarizes forest product permit sales for fiscal year 2000 from US Department of Agriculture Forest Service (FS) lands. Both tables will be referred to further throughout the text.

There have been estimates, based on surveys or other means, of the scope of various segments of the NTFP industry, particularly in the Pacific Northwest. We will discuss NTFP by several categories: 1) medicinals; 2) food and forage species; 3) floral and horticultural species; 4) resins and oils; 5) arts and crafts; 6) secondary wood products such as posts and poles; and 7) game animals and fur bearers.

1. Medicinals

Interest in the United States in medicinal plants began to rise rapidly in the early 1990s. Landes and Blumenthal noted that in 1988, potpourris were the most significant use for U.S. botanical products. In 1999, there were indications that consumer taste in medicinals was changing. Products from native species such as saw palmetto berries (*Serenoa repens*) and passion flower (primarily *Passiflora incarnata*), most of which had been exported to Germany, began to be produced in the United States. Prices rose sharply in 1989, while the potpourri market slumped. Goldenseal became scarce in places where it was widely harvested. Growing consumption by Americans and concern about protection of wild populations has spurred domestic crop production and simulated-wild agroforestry systems to accommodate demand. Domestication of medicinal species has led to greater internationalization of medicinal plant production. Commercial producers have been growing crops of some American species, such as common boneset (*Eupatorium perfoliatum*) offshore for more than two decades (Alexander and others 2002).

Multiple forms and combinations of herbal products are available to the American consumer. Raw materials are distinguished by the environment (wild-grown or farmed), by the manner in which they grew (organically or otherwise), and by how they are processed (dried whole, cut and sifted, or ground to a powder). Companies now market live native species or seed for people who want to grow their own.

The United States Harmonized Tariff Codes (HTC) track only one medicinal exported plant, American ginseng, and distinguish between wildcrafted and cultivated material. The export price of wild ginseng is two to four times greater than the price for cultivated ginseng. Since 1995, exports of wild ginseng have fallen in value from $30 million to less than $15 million. China (including Hong King) has been the major importer. Production of wild ginseng for

export has remained fairly constant at less than 200 metric tons annually, reflecting a maximum capacity for limited national production. The export volume of cultivated ginseng is about ten times that of wild ginseng, and the value has dropped 75% since the peak in 1992 at $80 million (Alexander and others 2002).

The harvest and sale of medicinals in California is quite important. The BLM shows one permit for St. Johnswort (*Hypericum perforatum*) being issued in 2000 (Table 1). Issuing permits for non-native species is a management strategy, and agencies are often quite willing to get help controlling them. Permits for the harvest of medicinal plants are issued by both agencies (Tables 1 and 2).

2. Food and forage species.

Most categories in the United States Harmonized Tariff Code (HTC) system identifiable to species or to species groups refer to food. Of all the native fruit products explicitly named in the HTC codes, blueberries (*Vaccinium* spp.) have the largest number of classifications. The major export species is *V. angustifolium*. Exports of fresh wild blueberries have remained somewhat constant since 1993 at less than 1,000 metric tons, with the largest share going to Canada. Maple sugar and maple syrup (primarily from sugar maple, *Acer saccharum*) are produced in the US; they are consumed domestically and exported. Since 1992, the value of maple product exports has exceeded $3 million annually. Pecans are also consumed domestically and exported. Most production comes from cultivars grown in orchards. Export quantities climbed from 1.5 thousand to 8 thousand metric tons between 1989 and 1998 (Alexander and others 2002). The FS has a special category for berry and fruit permits (Table 2). Blueberry and huckleberry picking is an important recreational, commercial, and traditional activity in forest sites throughout the mountainous northern states, from the west coast to the northeast.

Mushroom yields fluctuate so widely that it is difficult to generalize, but estimates of productivity may be used to make local site-specific estimates of productivity (Alexander and others, in press). Blatner and Alexander (1998) estimate that as many as 39 mushroom species are traded commercially in the Pacific Northwest, but both in the Pacific Northwest and nation wide, *Boletus*, chanterelles (*Cantherellus* spp.), morels (*Morchella* spp.), and American matsutake (*Tricholoma magnivelare*) make up the bulk of the industry. Exports of wild edible mushrooms have surged in the past two decades. Most commercially harvested American matsutake in the US are harvested in Washington, Oregon, and northern California. Two peaks usually occur in each year in mushroom HTC export data; a smaller spring peak corresponding to morel harvests, and a larger peak in the fall comprised mostly of chanterelles. According to Japanese import data, in 1997 more than 275 metric tons of American matsutake were exported to Japan (Weigand 2000). American matsutake export volumes are far lower than the morel and chanterelle export volumes going into the European Community, but volumes by species are not discernable from US export data. Various species of truffles have been harvested commercially in small quantities for some time. Truffle exports go primarily to Canada. Commercial mushroom harvest has grown considerably in the past 15 years, fueled by Japanese and European demand, and by increasing domestic demand. Mushroom permits issued by the BLM in 2000, sold for $15,185, were for an estimated 52,240 pounds (Table 1). Commercial permits are generally sold for 10 percent or less of the estimated shed (the first buying level) price. The FS sold $226,205 worth of mushroom permits in 2000 (Table 2). The compliance rate of people purchasing mushroom permits is quite variable. In well-established markets with oversight, such as in the Winema National Forest in Oregon, compliance is estimated to be as high as 85 percent or higher. In other areas, compliance is far lower. Permit sales can be used as an indicator of general demand and market size from one product type to another, and for shifts in demand. However, they cannot be used to calculate total consumption.

Forage grass species are particularly important to Federal and private land management in California and the Pacific Northwest, Rocky Mountain, and Southwest regions where grazing in or near forest environments is a major land use activity and where native range restoration is a goal. Common native grass and legume species provide valuable forage for domesticated animals and wildlife species, and are used for range reclamation and restoration. Some commercial grass forage species such as Indian ricegrass (*Achnantherum hymenoides*) are traditional staple crops of Native Americans. Programs for seeding lands with native forage accomplish two important elements of Federal trust responsibilities to recognized Indian tribes: restoring ecosystems with traditional food species and providing high-quality forage for native game species such as buffalo and pronghorn antelope (Alexander and others 2002). Forage and hay sales are very important from BLM and FS lands (Tables 1 and 2). The BLM sold 547 tons of forage and hay in 2000, and the FS sold $161,332 worth of grass permits.

3. Floral and horticultural species

Climate conditions provide the major divisions for availability of Christmas trees in various regions of the US. True firs (*Abies* spp.), spruces (*Picea* spp.), pines (*Pinus* spp.), and Douglas-fir (*Pseudotsuga menziesii*) are the major Christmas trees in all regions except in California, the Southeast, and Florida. In California, redwood (*Sequoia sempervirens*) and giant sequoia (*Sequoiadendron giganteum*) are major Christmas tree species. In the Southeast and Florida, eastern redcedar (*Juniperus virginiana*) is one of the two most important Christmas trees regionally. Tradition and cultural use also influences Christmas tree use. Eastern redcedar is common as a Christmas tree only as far north as Virginia although the species ranges on the Atlantic seaboard north to southern Maine. People in interior Alaska are accustomed to harvesting black and white spruces (*Picea mariana* and *P. glauca*) for personal use from public lands without charge or regulation. In the Southwest, juniper Christmas trees cut on rangelands helped to reduce woodland encroachment. In the West, Mid-West, and Northeast, public land managers also permit individuals to cut trees for personal use with no or minimal charge (Alexander and others 2002).

A tremendous variety of native plant, lichen and moss species supply commercial foliage, stems, branches, fruits other vegetation for use in the winter holiday season and in the year-round floral industry. The harvest and use of native species has a strongly regional character, particularly for the species that people wildcraft. Species availability and use can change rapidly with changes in taste and with the introduction of new items to the marketplace. Florida, the Southeast, and the Pacific Northwest are major centers for fresh foliage products, serving both domestic and foreign markets. These regions have many native non-conifer evergreen species for nearly year-round availability. The array of native species used as fresh foliage overlaps the species used as preserved foliage. For example, salal (*Gaultheria shallon*), beargrass (*Xerophyllum tenax*), and iron fern (*Rumohra adiantiformis*), all in the fresh foliage market, are widely available in the United States as preserved materials. One of the most important dried foliage products in the United States is white sagebrush (*Artemisia ludoviciana*, better known in the trade as silver king or silver queen), used as a filler to provide the body of a wreath or other display. Grass species are very common in dried floral markets. In the Southeast, native grape (*Vitis* spp.) vines are a widely used floral material. There are numerous conifer species used in both the holiday greens and the floral markets. The demand for Christmas greens is less subject to change than products used in the floral markets, as holiday uses are based on traditions that change slowly. However, early storms in the mountains can limit harvested volumes in any given year. Further, changing resource management objectives on federal lands and the associated changes in the age class distribution of the forest may result in the reduced availability of harvestable boughs from selected species (Alexander and others 2002).

Boughs and greenery are significant products harvested on public lands. In 2000, the BLM sold 340 tons of boughs and 467 tons of greenery, for a combined price of $27,337. They also

sold 68 tons of moss (Table 1). The FS sold permits valued at $331,929 for boughs and greens, and moss permits for $11,775 (Table 2).

4. Resins and oils

This section synthesizes current information on plant and lichen species native to the United States and its territories used as fragrances and flavors. Industrial chemists use aromatic plant compounds in air fresheners, bath products, diffusers, hair- and skin-care products, inhalants, massage oils, and perfumes. Food flavorists also use many of these same essential oils to flavor foods or to impart a combination of fragrance or flavor to pharmaceuticals. A few species native to the United States have a long tradition of commercial industrial uses as fragrances and have international markets: eastern arborvitae (*Thuja occidentalis*) and eastern redcedar, for example. Other species such as wintergreen (*Gaultheria procumbens*) and sassafras (*Sassafras albidum*), although native to North America, are increasingly grown commercially in other countries, in particular China and Vietnam. Many other species native to the United States and its territories are no longer produced commercially because costs of labor and production are prohibitive to commercialization (Bauer and others 1997). Certain common species such as balsam fir are still wildcrafted in the Northeast and the northcentral states. A partial list of species native to the US used for essential oil production in North America includes balsam fir (*Abies balsamea*), sweet birch (*Betula lenta*), alligator juniper (*Juniperus deppeana*), eastern redcedar, Labrador-tea (*Ledum groenlandicum*), black spruce, eastern white pine (*Pinus strobes*), goldenrod (*Solidago canadensis*), northern white-cedar (*Thuja occidentalis*), and eastern hemlock (*Tsuga canadensis*). The range of species currently used in the perfume industry is narrow, particularly when only North American species are considered. By contrast, resins and oils are important NTFPs in the United States. Moerman (1998) provides a comprehensive summary of native plant species used as fragrances and incense that have subsistence and cultural importance. Conservation of many of these species is important for land managers and landowners, especially in areas that comprise ceded lands or customary use lands as defined in treaties between the U.S. Government and sovereign Indian tribes.

Eastern redcedar and alligator juniper oils are the primary exported oils from the US. Some cedar oil from western redcedar (*Thuja plicata*) in the Pacific Northwest and from eastern arborvitae in the Upper Midwest may also be exported, but most Canada produces most of the oils from these two species. Unfortunately, clear conclusions about cedar oil export data are impossible because the same HTC code in the United States includes nutmeg oil and clove oil. Most exports of pine oils, a byproduct of the nontimber biomass from whole tree harvesting, leave by way of the Charleston, Savannah, Miami, and Tampa customs districts. The two major trading partner nations are Canada and the United Kingdom. Total export value has fluctuated between $6 and $9 million between 1989 and 1998. Production of turpentines from gum and wood products, primarily from pine species and long-leaf pine (*Pinus palustris*) in particular, concentrate in the Southeast. Target partner trading countries and ports of departure are different. On the one hand, the Savannah custom's district is the major point of origin for export to France, the major European trading partner. Most turpentine destined for Mexico, the other major trading partner, passes through the Laredo TX customs district. The total values of exports of turpentine differ considerably from year to year (between $3 and $8 million). The total value is usually less than that of pine oil exports (Alexander and others 2002).

5. Arts and crafts

The use of nontimber forest products in arts and crafts is an integral part of innumerable traditions in the United States. From Native American use of bark, willow and branches in baskets, masks, traditional and ceremonial dress, to doll-making and baskets in the Appalachians, to furniture, birdhouses, bowls and other well-known and admired Shaker products, the plants used are as varied as the products created. Many sources have

documented the use of nontimber forest products in arts and crafts (e.g., Emery 1998; de Geus 1995). An Internet search yields innumerable sites for basket weaving, basket making supplies, crafts, and cane chairs, to name a few products. Although many of the plant materials used in arts and crafts come from India, there are products in the US that are unequalled anywhere else in the world, such as the pine cones from sugar pine (*Pinus lambertiana*) and western white pine (*Pinus monticola*). The arts and crafts markets have experienced great increases in demand. As many of the products are created in rural communities and are traded or sold without records, information about these markets has not been fully summarized. In addition, the diversity of products makes these markets difficult to track as a group. It should be acknowledged, however, that these are significant products that contribute in important ways to household economies and have important meaning across US cultures (Alexander 2002). The BLM sells permits for burls, cones, and hobbywood, in almost every western state. They sold an estimated 1,331 cubic feet of hobbywood and 41,722 pounds of burls in 2000 (Table 1). The FS sold cones and bark in that same year (Table 2).

6. Secondary wood products

The demand for most types of wood products is covered in other Indicators. However, Table 1 gives a glimpse into the demand for many types of wood products that are not always obvious when data is summed for all types of wood and fuel use. Fuelwood is very important to people who have access to public lands. Permits for fuelwood sold by the BLM are significant in all western states that have BLM lands, from Alaska to New Mexico. The BLM sold an estimated 1,601,935 cubic feet of fuelwood and 560,686 cubic feet of poles and rails in fiscal year 2000. Posts and poles are also a significant category, from small poles to house logs. Many people rely of public lands as a source of fuelwood for personal use, and many small businesses survive on the harvest and sale of posts and poles.

7. Game animals and fur bearers

Ecosystems in the United States support some of the most diverse temperate forests, warm deserts, and shallow-water wetlands found in the world (Ricketts and others 1999). The composition and configuration of wildlife habitat is fundamentally affected by land use activities. Changes in land use affect changes in wildlife populations and harvests. Land use changes most likely to significantly affect wildlife populations and harvests include the increase in urban and built-up land, the retirement of cropland acreage into the Cropland Reserve Program, changes in forest successional stages, the extensive loss of grassland habitats, and the continued loss of wetland habitats. Based on these changes, Flather and others (1999) expect increase in species that tolerate intensive land use activities, increases in species associated with agricultural habitats, decreases in species associated with grasslands and early successional stages of forest habitats (especially in the north), and general declines in species dependent on wetlands.

Following Flather and others (1999), this discussion will address game animals and fur bearers by major species categories, including: big game, small game, migratory game birds, and furbearers.

Big game: Big game are primarily large mammal species taken for sport or subsistence. Wild turkeys (*Meleagris gallopavo*) are included in this category. Wildlife conservation has focused on these species and many are now highlighted as wildlife management successes. Nationally, estimates of big game populations have increased substantially since 1975, including wild turkeys, deer (*Odocoileus* spp.), elk (*Cervus elaphus*), and black bear (*Ursus americana*). Exceptions to the pattern include deer in the West, wild turkey in the Rocky Mountains, and pronghorn (*Antelocapra americana*) in the South. Some of these population numbers are, however, difficult to interpret (Flather and others 1999). Big game contribute

significantly to rural economies through recreational harvests, but overabundant populations of some species can carry significant economic and ecological costs.

Since 1955, trends in wildlife-oriented recreation activities have been monitored by the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Participation in big game hunting has increased in every survey period since 1955. Both the number of hunters and the time devoted to hunting has increased. More days are spent hunting big game than any other category of hunting (Flather and others 1999).

Small game: The number of small game hunters has declined at a nearly constant rate since the mid-1970s. Based on data from states that can provide both population and harvest data for small game, about 15 to 20% of the small game population is harvested each year, ranging from a low of about 3% for hare (*Lepus* spp.) to a high of 31% for ring-necked pheasant (*Phasianus colchicus*). Few state wildlife agencies monitor small game populations. Factors affecting small game populations include weather, predation, and habitat quality. It does appear that species associated with rangeland or agricultural habitats show evidence of declining populations, while species in forest habitats showed mixed trends over time. Northern bobwhite (*Colinus virginianus*), prairie grouse (), and western quail (*Callipepla* spp.) all show evidence of declines. Hare and western quail show evidence of declines but the trends are mixed. Cottontail rabbit () and ring-necked pheasant have increased in population. Forest associated species such as squirrels (*Sciurus* spp.) and forest grouse (various genera) show mixed trends among regions. No upland game bird has shown significant long-term population increases, but the California quail (*Callipepla californica*) and greater prairie-chicken (*Tympanuchus cupido*) have shown increases since 1985. Detectable population trends are most likely habitat related (Flather and others 1999).

Migratory game birds: From 1975 to 1996, there was a steady decline in the number of migratory bird hunters. The most recent survey indicates participation in migratory bird hunting may be increasing. "Migratory game birds" refers to a collection of species that include waterfowl and webless migratory species, such as America woodcock (*Scolopax minor*) and mourning dove (*Zenaida macroura*). Conservation and management is the responsibility of Federal agencies. The primary objective of treaties the United States has with Canada, Mexico, Japan, and the Soviet Union is the protection and conservation of migratory birds. Harvesting in a manner consistent with conservation is a secondary objective. The history of monitoring migratory birds in North America has resulted in the most extensive and reliable estimates of population and harvest in the world (Nichols and others 1995). Population and harvest trends are published annually by the U.S. Fish and Wildlife Service. Flather and others (1999) provides extensive detail on specific species.

Furbearers: The national trend in fur harvests has declined from a peak of 20 million pelts in 1980 to a low of 3 million pelts in 1991. Since 1991 there has been a modest increase in fur harvest, reaching 6 million pelts in 1995. Muskrat (*Ondatra zibethicus*) and raccoon (*Procyon lotor*) are the two most commonly harvested species. Although furs harvested by trapping remain an important source of pelts, most pelts are produced by fur farms that primarily raise mink (*Mustela vison*) and fox (various spp.). From 1987 to 1990, trapped mink dropped from 8% of the total harvest to about 4%. To sell into Europe, the fur industry must continuously demonstrate compliance with the humane trapping standards adopted by the European Economic Community. State populations of most furbearers (beaver (*Castor canadensis*), raccoon, muskrat, coyote (*Canis latrans*), bobcat (*Lynx rufus*)/lynx (*L. canadensis*), and red fox (*Vulpes vulpes*)/gray fox (*Urocyon cinereoargenteus*)) were estimated to be at or above carrying capacity. Several species have the capacity to cause significant economic damage (e.g., beaver, coyote) or can be a public health concern (e.g., raccoon) when populations exceed carrying capacity. Few states report furbearer populations below carrying capacity. Many biologists project populations to continue to increase unless there are disease outbreaks, due to improving habitat conditions and low fur prices (Flather and others 1999).

C. Limitations of data presented.

Current approaches include analysis and summaries of USDI Bureau of Land Management permit data, industry surveys, USDA Forest Service Sales Tracking and Reporting System (STARS), Harmonized Tariff Code data, State and Federal game harvest information and biological population function estimates, and other data sources and analysis at regional or local levels. Although for some industries, locations, and specific species these analyses may be comprehensive, that majority are incomplete and do not fully represent the range of products.

Prominent data gaps include personal use of NTFPs, informal economic activity, and production and value from private lands. Determination of totals harvest and demand is very difficult. There is no single source of data for NTFPs, nor is it expected that there ever will be. It is unclear how consistent or comparable data sources are in terms of units, value and scale. It can be difficult to differentiate cultivated quantities from wild, in part because they are aggregated in record keeping. In addition, annual variation in production can depend on economic conditions, biological productivity, and consumer demand, all of which are not well understood.

There are several possibilities to address data needs for this Indicator:

- Choose several key NTFPs based on ecological sensitivity or economic/social importance, and develop pilot studies to measure both biologically and socially sustainable levels of harvest using the concepts of population biology, social science, economics, and ecology. One goal of the studies would be to address protocol transfer and use for other NTFPs. The pilots would seek to examine sustainability at regional levels and develop ways to summarize them at the national level. Some studies like these are underway; one example is an effort to develop collaborative management and profit sharing in Washington with an agreement between the landowner and an organized group of harvesters. Another is an ongoing study of salal ecology and response to harvest in Washington.
- Current studies may result in suggested changes to Forest Inventory and Analysis (FIA) data collection.
- Further studies on aspects of value for NTFPs, how to assess economic value, and documenting commercial, subsistence, and personal use of NTFPs are needed.

II. Problems related to scientific, social/political, economic, and institutional concerns.

General scientific:

- Need to determine national level of harvest and sustainable level for products.
- There is no regularly collected data on harvest amount (commercial, personal use, cultural and traditional use).
- It is unclear how to design a statistically valid method to collect data.
- NTFP species cover every phylum; thus it is hard to make generalizations about suggested inventory and monitoring protocols, regional or national harvest suggestions, land management to optimize production of all species, and so on.
- Need to create unit measures of variability (e.g. weight, volume, counts, etc).
- Need a method to measure annual variation in production of NTFPs.

Social/Political:

- NTFPs are a significant contributor to household economies and income, for which almost no data are collected.

- Access issues and harvest tenure rights have been getting more attention lately; these issues need further exploration.
- Industry is reluctant to release information.
- HR2466 Sec. 339, part of the fiscal year 2000 appropriations budget, titled "Pilot Program of Charges and Fees for Harvest of Forest Botanical Products". The law defines botanical products as florals, mushrooms, etc. removed from Federal forests (excluding wood products), defines "fair market value", and requires that permit fees be based on a determination of "fair market value" and sustainable harvest levels. This law is having a considerable impact on the development of appraisal methods and on commercial nontimber forest product harvesting on federal lands. Proposed Codified Federal Regulations (CFRs) for HR2466 Sec. 339 will be published in the Federal Register in spring 2002.

Economic:

- Funds are needed for data collection and pilot studies, and for consolidating NTFP data for all U.S. forests into a national database.
- Significant data gaps need to be filled for adequate measurement of this indicator.

Institutional:

- Historically, NTFPs have not been a very high administrative priority of federal/state agencies. Recent Federal law (HR2466 Sec. 339) means more attention will be focused on Federal public lands.
- There is no one institution that is responsible for this Indicator.
- There are no regularly collected data on harvest amounts for most products.
- There is no tracking of products through wholesale and retail markets, to the end consumer, for most products.

III. Cross-cutting issues and relationships with other Indicators.

A. Cross-Cutting Issues raised by CTC 6:

• The database on quantity for this indicator should be consistent with that for Indicators 14, 30, 32, and 34.
• The database on quantity for this indicator should be consistent with that for Indicator 30.
• Sources of information include: formal databases, other quantitative information, and qualitative information. Qualitative information is especially important to the interpretation of this indicator.

B. Cross-Cutting Issues from Other Indicators:

• Value and databases for quantity should be the same for 14, 30, 32, 34
• Total Biomass, All Live Tree Volume, and Growing Stock: 11, 26, 27, 28, 29, 30, 31, 32, 33, 34 (From Indicator 11)
• "Investment affects production and consumption:" 29, 30, 31, 32, 33, 34, 38, 39, 40, 41 (From Indicators 38-41)

C. Other Cross-Cutting Issues:

•Non-wood: 14, 15, 17, 30, 32, 34, 38, 58
•Non-wood Variables: 14, 30, 32, 34

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Table 1. USDI Bureau of Land Management special forest product sales in fiscal year 2000. (Table will be modified when more data are available)

RPA Region	Product	Units sold	Unit measure	Number of permits	Permit sales
Alaska	fuelwood	33,578	Cubic feet	41	$0
	House logs	3,097	Cubic feet	4	$0
California	boughs	50,500	pounds	7	$1,530
	St Johns-wort	200	pounds	1	$20
	Floral greenery	2,776	pounds	8	$238
	fungi	1,600	pounds	29	$975
	Seed cones	70	bushels	2	$44
	fuelwood	40,832	Cubic feet	189	$2,643
	poles	163	Cubic feet	1	$350
Pacific Northwest	boughs	602,983	pounds	202	$23,504
(OR, WA)	Burls, misc	41,715	pounds	32	$5,445
	Hobbywood, misc	679	Cubic feet	8	$86
	Christmas trees	1,112	number	994	$5,237
	medicinals	8,320	pounds	12	$364
	Forage, hay	232	tons	12	$983
	Floral greenery	919,963	pounds	1,153	$48,863
	Moss and lichen	135,717	pounds	89	$4,514
	fungi	50,640	pounds	744	$14,210
	Seed cones	1833	bushels	11	$464
	Native seed	1,000	pounds	1	$80
	transplants	13,583	number	41	$632
	fuelwood	419,066	Cubic feet	1823	$34,245
	House logs	929	Cubic feet	1	$1,710
	poles, rails	557,402	Cubic feet	135	$2,656
	Misc. pulpwood	18,412	Cubic feet	6	$6,844
Intermountain	boughs	38,200	pounds	24	$401
(MT, ID, WY,	Burls, misc	7	pounds	53	$330
NV, UT, CO,	Hobbywood, misc	652	Cubic feet	4	$48
AZ, NM)	Christmas trees	16,749	number	9674	$63,567
	Pinyon nuts	20	pounds	1	$5
	Forage, hay	315	tons	6	$1,380
	Floral greens	10,401	pounds	66	$511
	Seed cones	13,634	bushels	113	$1,454
	Native seed	75,282	pounds	777	$12,816
	transplants	13,662	number	212	$12,215
	fuelwood	1,142,037	Cubic feet	3,902	$73,423
	House logs	87,580	Cubic feet	4	$6,480
	Poles, rails	93,121	Cubic feet	1084	$17,222

Table 2. USDA Forest Service special forest product sales in fiscal year 2000.
(Table will be modified when more data are available)

Product	Units sold	Permit sales
Christmas trees	230,252	$1,328,403
transplants		$185,025
boughs		$282,011
Floral greens		$49,918
bark		$230
cones		$20,315
seed		$8,662
Fruits,berries		$2,990
Tree sap		$3,379
Roots		$465
Fungi		$226,205
Moss		$ 11,775
Herbs		$2,469
Wildflowers		$11,528
Grass		$161,332
Cacti		$50
insects		$100
Misc.		$4,065